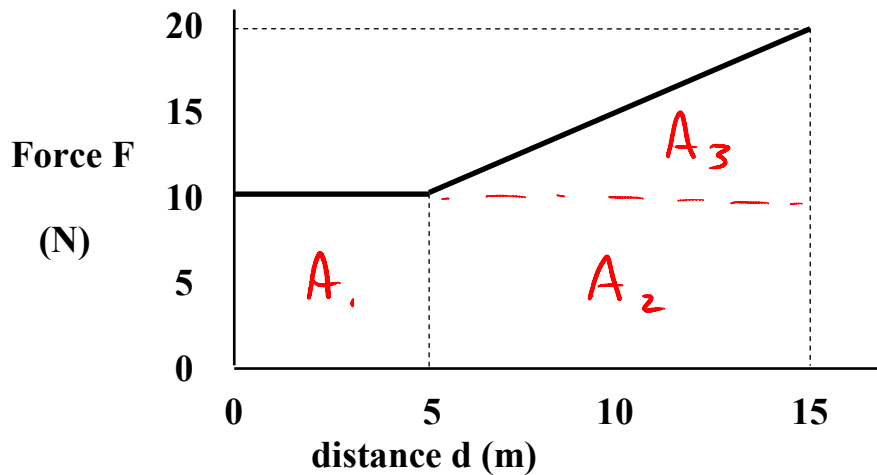


Example #5: A 5.0 kg cart is accelerated using a varying force. The force is a constant 10 N for 5 m, then increases at a constant rate up to 20 N for another 10 m.

a) What is the total work done on the cart?

b) If the cart was going 24 m/s when this began, what is its speed now?



$$\begin{aligned} \text{a) } W &= F \times d = \text{area under the graph (y} \times \text{x)} \\ &= A_1 + A_2 + A_3 \\ &= 5(10) + 10(10) + \frac{1}{2}(10)(10) \end{aligned}$$

$$\boxed{W = 200 \text{ J}}$$

$$\begin{aligned} \text{b) } W &= \Delta E_k = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \\ 200 &= \frac{1}{2}(5) [v_f^2 - 24^2] \end{aligned}$$

$$\boxed{v_f = 26 \text{ m/s}}$$